

a marked degree of success. Another season might show more attempts at nesting, but greater mortality.

COLUMBUS, OHIO.

NOTES ON THE SONG AND TERRITORIAL HABITS OF BULLOCK'S ORIOLE

BY ALDEN H. MILLER

Possibly there are many students of birds who have noted the song of the female Bullock's Oriole, but it would appear from a perusal of the general accounts of the natural history of this species as set forth in the better known manuals of American ornithology that the female *Icterus bullocki* is not given proper credit as a singer. Primarily to correct this impression regarding song a short and unfortunately fragmentary observational record of two pairs of Bullock's Orioles is presented here. The songs of female orioles of other species, as for example, *I. galbula*, in some cases are well known.

In the vicinity of Pinole, Contra Costa County, California, in the winter and spring of 1930, several California Loggerhead Shrikes were under my observation for a period of six months. Incidental to this study of the shrikes other bird species came to my notice, among them several pairs of orioles. The region studied consisted of an open pasture with a number of steep-banked ravines cutting through it (see figure 14). Willows were the principal trees although a few cottonwoods, live oaks, valley oaks, and buckeye trees were present. The grass in the pasture did not attain a height of more than fifteen inches during the 1930 season. A few low tangles of rose bushes were present in the bottoms of the ravines.

Male orioles had arrived in the region under consideration on March 27, 1930, and were in full territorial song. These birds were not present on a previous visit on March 24. Songs of two males were recorded on this date at 7:45 in the morning, the method used being that employed by A. A. Saunders (New York State Museum Handbook 7, 1929, p. 140), except that absolute pitch was not recorded. The two songs were identical and could not be distinguished from songs, probably of the same males, that were uttered a month later on the same territories. On March 27 one male occupied the line of willows, territory B, to the west of the bridge shown in figures 14 and 15, while the other male occupied the two clumps of willows east of the bridge, territory A. These males were not followed closely by me at this time but each appeared to have established possession of

a territory as indicated. The male of territory B sang most frequently from the tree in which later the nest was located (nest site marked by B in figure 15). The male of territory A sang either from the trees marked 1 or at the point A where the nest of this bird later was built.

On April 16 female orioles were noted but it is believed that they were present several days earlier. Notable actions of the females were not observed until the morning of April 25 when both males A



FIG. 14. View looking north across the territories occupied by two pairs of *Icterus bullocki* near Pinole, Contra Costa County, California. Photo-taken April 30, 1930.

and B were paired and the pair A appeared to be attempting an invasion of the territory of pair B. Although the possibility of confusing female and first-year male Bullock's Orioles is great, the obviously mated condition of these pairs of birds made it certain that the two dull-colored individuals were females. The two males were in full adult plumage. Members of a pair were almost constantly in close company, often being within two feet of one another.

At 9 A. M. on April 25 my attention first was drawn to pair A which, the female leading in flight by a few feet, attempted to alight in the tree marked 2 which was next to the singing post of male B. The males hovered and screeched near one another and the pair A

then left the tree and came to rest on the east railing of the bridge. Once having alighted here, female A began to beg of male A and pursue him along the railing of the bridge, fluttering her wings, posturing occasionally, and uttering a low *clu-r-r* of unusually clear quality for this species. The male was pursued in this manner for a few feet when female B came to the railing and darting at female A drove her from the bridge and thereafter pursued and begged of male A in identically the same fashion as had female A. In the meantime male B was singing at short intervals from the top of the tree at 2. When female B had pursued male A to the end of the bridge, male A flew to the grassy slope of the ravine and there was joined by female A. Female B returned to a perch in the trees near male B.

While pair A was on the ground on the ravine slope, female A stood erect and sang the song (♀ A) recorded in figure 16. This song was repeated at least six times before the pair flew to the tree at A. In the trees the male sang the song (♂ A) represented in the figure, the female roughly alternating with her somewhat different song.

For a period of one hour repeated attempts at invasion of territory B by pair A were witnessed. At least ten such attempts were seen. The behavior of the birds was in general the same each time although with a few significant differences. Female A usually flew in advance of male A as this pair attempted to invade the tree at 2. On two occasions the repulsion of pair A involved all four birds, the two males fighting one another and the two females fighting one another in the short grass at the south end of the bridge. Female B repeatedly was excited by the begging of female A and by the presence of male A and was successful in driving away female A and in begging from male A herself. Female B courted male A only when male A was near the bridge; she did not follow him into his territory east of the bridge. Female B several times begged from male B in the tree at 2 but details of her actions were obscured by the foliage. In several instances females A and B simultaneously pursued and courted male A. Only once was female A able to withstand the attack of female B and continue to pursue male A along the bridge railing unmolested. During my observations on this day I was located at the point marked X.

The songs of the two females were not identical as may be seen in figure 16, yet they both were easily distinguishable from the songs of the males. The songs of the two males always were extremely similar one to the other. The females sang repeatedly from the ground

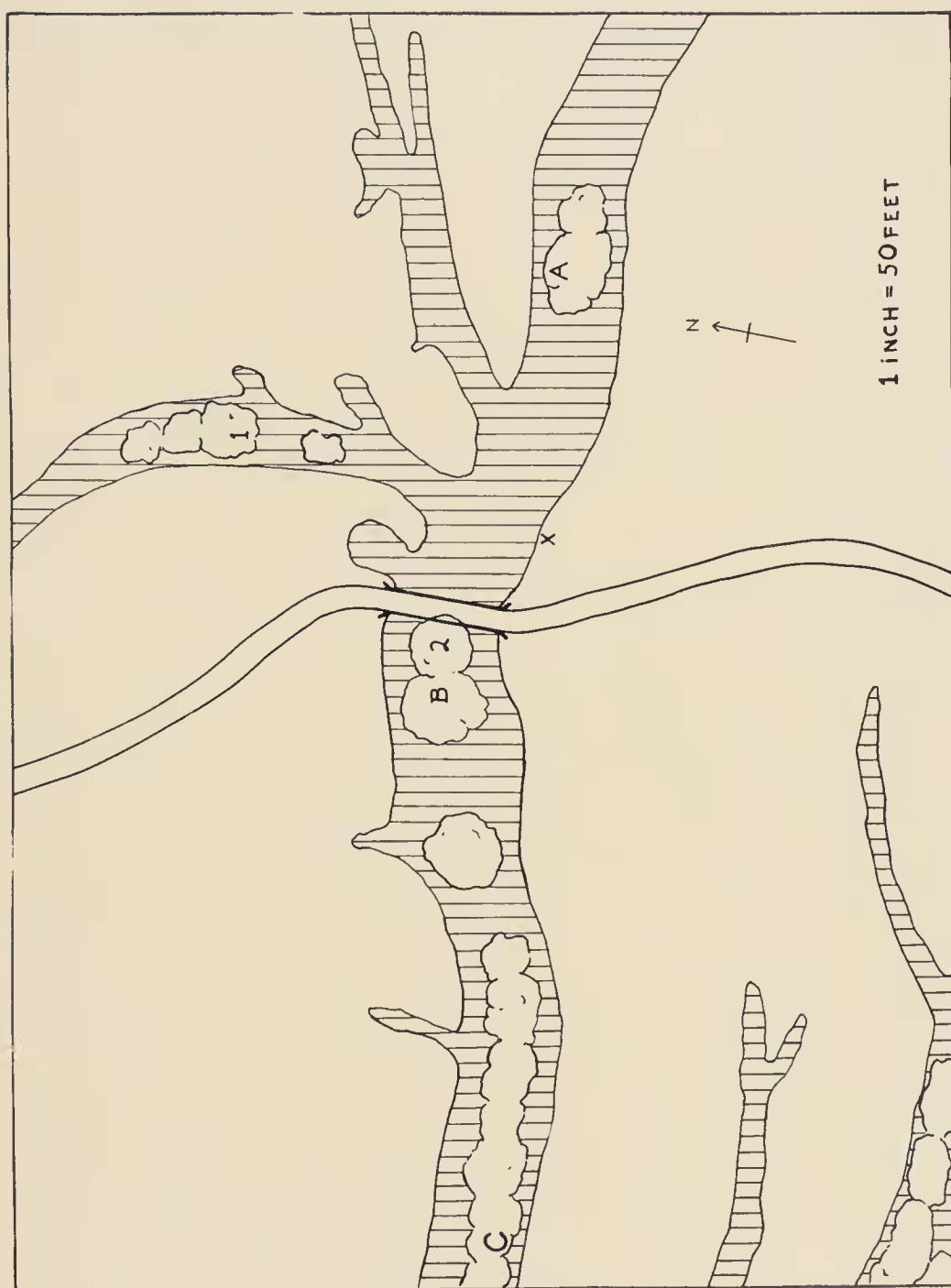


FIG. 15. Sketch map of territories of *Icterus bullocki* shown in figure 14. Shaded areas indicate ravines.

whereas the males with one or two exceptions sang only while in the trees. The females sang in the trees near their respective males. In pair A it was estimated that during the hour from 9 to 10 A. M. the female sang five times as often as did the male. In pair B the female sang slightly less frequently than did the male.

On May 27 the two nests of these pairs were located. The nest of pair A was situated on the north side of the willows at A, eight feet above the ground and contained young estimated to be about three days old. The pair B had built a nest twenty-five feet above the ground in the crown of the tree at B. This nest contained four young between ten and twelve days of age. The nest of pair B was larger and more neatly fashioned at the top than was the nest of pair A. From the findings on this day it may be supposed that on April 25 the orioles were beginning or contemplating nest construction. Pair B was about one week more advanced than pair A.

No singing was noted on May 27 although both members of each pair appeared at their respective nests and scolded as I inspected their young. Pair A in their foraging did not attempt to pass west of the bridge and invade the territory of pair B. Apparently pair B had been successful ultimately in defending the area west of the bridge. On this day a third pair and nest was found at the point C.

Concluding and summarizing from these observations, the male Bullock's Oriole arrives on the breeding ground before the female and establishes a singing post, perhaps the entire territory. The females arrive one to two weeks later and come to occupy a territory jointly with a male. The female shares in the defence of territory and perhaps, as seen in pair A, may be responsible for attempted, and doubtless sometimes successful, alterations in the outlines of the territory. In the case of territory A it appears to me that there were relatively few trees present in which to forage and that this circumstance may have led to the impulse to annex the trees at 2. The male and female of a pair do not coöperate completely in the defence of territory at least at a time before the nest is built. That is, a female during this period possesses an urge to defend a territory to the exclusion of other females, the male to the exclusion of other males. Other males during or preceding nest building are not repulsed from the territory by the female but instead may be acceptable to the female and may be courted. The converse doubtless is true of the male at other periods in the breeding season. Certainly the male before nest construction is tolerant of two females within his territory. At the beginning of nest construction the females pursue and beg from

the males, posturing, fluttering the wings, and singing. At this time the males appear to be passive, and consistently move away from the advances of the females. Nevertheless, in flight the males may follow after the females. The difference in the aggressiveness of the two females A and B on April 25 may have been due to a more ad-

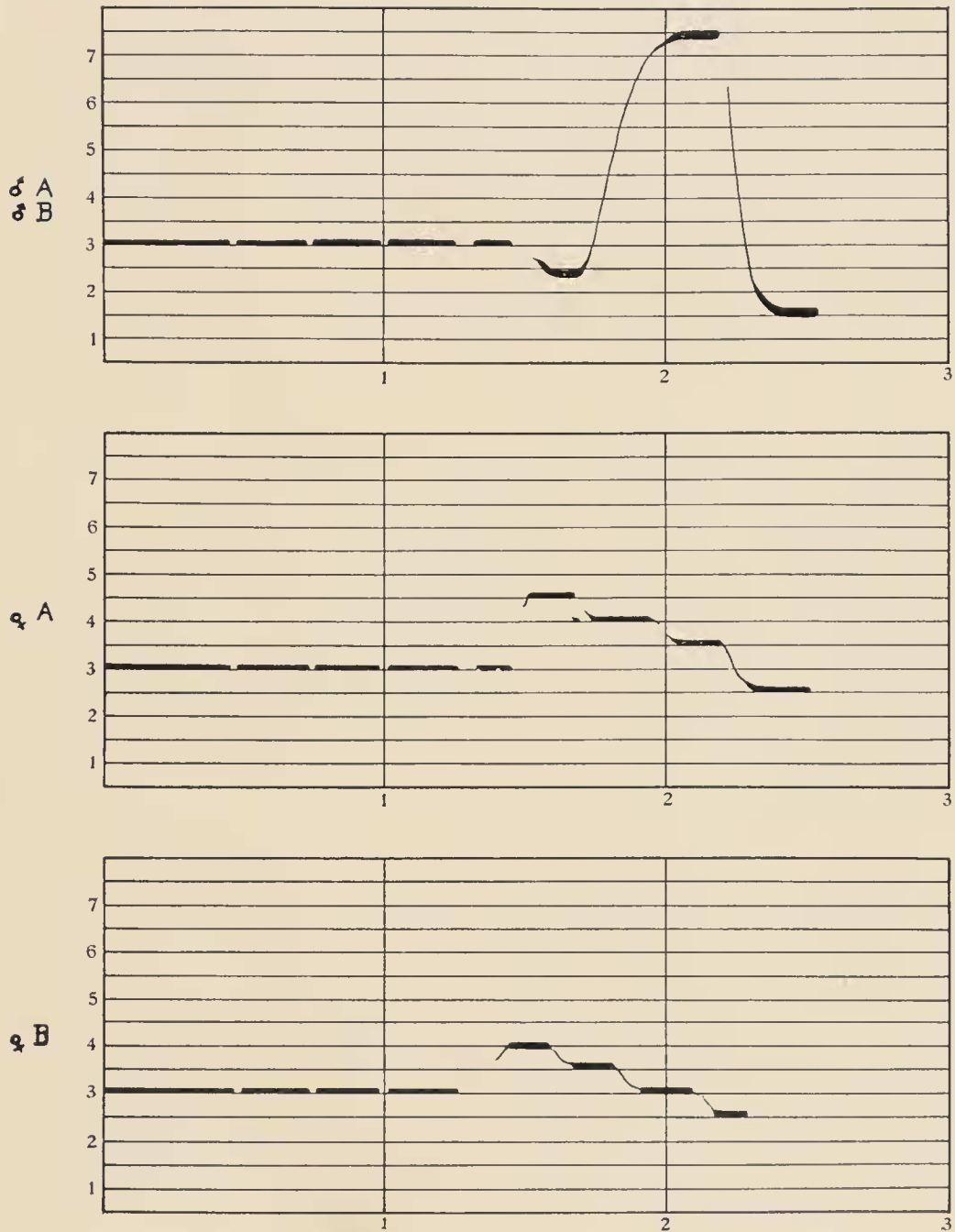


FIG. 16. Graphical representations of songs of *Icterus bullocki* recorded on territories A and B near Pinole, Contra Costa County, California, between 9 and 10 A. M. on April 25, 1930. Numbers on vertical axis indicate whole tones of pitch (absolute pitch not recorded); numbers on horizontal axis indicate seconds of time.

vanced sexual and territorial cycle of behavior in female B as evidenced by the greater age of her young on May 27.

The utterances of female Bullock's Orioles while in defence of territory and in association with males in every way are comparable to the songs of males and may be considered as true territorial songs. The song of the female is similar to that of the male in rhythm, pitch, and quality except as regards the concluding notes of the song which in the female are slightly harsher in quality, range over lesser intervals of pitch and show important modifications of the rhythm as compared with those of the male. Before or during nest building the songs of females on occasion may be even more abundant than the songs of the males.

MUSEUM OF VERTEBRATE ZOOLOGY,
BERKELEY, CALIFORNIA.

THE STATUS OF THE GOSHAWK IN PENNSYLVANIA

BY GEORGE MIKSCH SUTTON

Ornithologists have for years regarded the American Goshawk (*Astur a. atricapillus*) as a rare and irregular visitor during the winter months in Pennsylvania. Occasional remarkable invasions have been noted, of course, such as those which occurred during 1905 and 1907, and from November, 1926, to March, 1927, when the species was very abundant (*Cardinal*, Vol. II, No. 2, July, 1927, 35). It appears from recent investigations, however, that the Goshawk is at least locally a fairly common and regular late fall migrant or winter visitor in this Commonwealth.

Prior to personal observation and study of the remarkable hawk migration which takes place each fall at Blue Mountain, near Dreherstown, Schuylkill County, it was noted that Goshawks were always mentioned among the birds of prey regularly observed in this region. It was believed at the time that those who made this report did not know the Goshawk, since the average hunter does not, as a rule, accurately distinguish the several members of the hawk tribe. On October 19, 1927, however, four Goshawks were killed at Blue Mountain. On October 22, sixteen more were killed, of the fifty or more that were seen; and these birds were not, apparently, part of an unusual invasion such as had occurred during the preceding fall. The hunters of the region recognized the birds as Goshawks at once, and were surprised to learn that their regular occurrence there was considered unusual. They sometimes called the birds "Gray Hawks," because the finely